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The Development of Higher Education in Russia: an Assessment Methodology

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Abstract

The paper presents a methodology for assessing the status of the higher education (HE) system, together with the results of its application. A monitoring system for HE in Russia is proposed using the indicative figures grouped in two units (the Conditions of Operation and Status of Infrastructure and state Educational and Research Activities of the HE System at the level of the Russian Federal Subject).

The analysis conducted over a time period of 12 years has shown that, unfortunately, a direct correlation between the growth of investments and an increase in quality is not observed. It is clear that the leaders in terms of financing and the leaders in terms of improving the quality of education are two different things. This demonstrates the need to reform regulation of HE, particularly with regard to prioritising its development and improving the financial and economic mechanisms required to achieve this.

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Keywords: system of Higher Education; indicative analysis; UFD; operating conditions and the status of the infrastructure of HE; status educational and research activities in HE

1. Introduction

Abbreviations

HE	Higher Education
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NE	Normalised Estimates
UFD	Urals Federal District
RF	Russian Federation
KhMAD	Khanty-Mansi Autonomous Districts
YaNAD	Yamal-Nenets Autonomous Districts

The intensification of globalisation processes and the formation of an international labour market are having a significant impact on the patterns of development of national systems of vocational education. The result of this influence in Russia has been a wide-ranging reform of the entire education system, the final stage of which was the adoption of the new Federal Law “On Education in the RF” (№ 273-FZ of December 29, 2012). Entering into force on 1 September 2013, the law significantly changed the structure of HE in Russia, securing the legislative implementation of the basic principles of the Bologna Declaration.

In terms of the goals of Russia's accession in 2003 to the Bologna process and the consequent adoption of this law, can be mentioned, firstly, support for the formation of and adherence to a common European educational space, and secondly, the creation of the necessary conditions to change the country's role in the international division of labour and the emergence of possibilities for integration into the global labour market. The task of creating a single European educational system that is competitive in relation to other global education systems (American and Asian) is forcing changes in approaches to the functioning of the national system of vocational education, directing it towards the creation of a unified, tiered, transparent system of training of qualified specialists.

At present, economists are facing acute questions concerning the economic feasibility of the structure of the educational process, in terms of supply and demand of the labour market and educational services and an optimisation of the activities of HE institutions in terms of attracting school leavers towards careers prioritised by the requirements of economic development. Ongoing problems remain: an imbalance in the structure of the producing specialisms by education level (higher-middle-vocational) and a poor orientation of educational institutions towards the actual needs of the national economy, leading to a decrease in the effectiveness of the vocational education system. Every year, the proportion of HE graduates grows at the same time as the proportion of mid-career professionals declines: in 1990, the number of graduates from secondary and primary vocational education was 4.8 times greater than HE graduates, whereas in 2013 those graduating with HE degrees were 1.5 times more numerous than secondary and primary vocational education graduates.

Likewise, one of the problems facing Russian professional education consists in a contradiction between individual preferences and the needs of the real economy in terms of the choice of educational paths. By 2012, the number of HE graduates majoring in social sciences and humanities accounted for 73% of the total output, with 33% having opted for Economics and Management (Regions of Russia, 2004; Regions of Russia, 2008; Regions of Russia, 2010; Regions of Russia, 2013).

Currently, there are quite a number of different Russian and international rankings providing a diverse assessment of HE institutions. Analysis of the status of HE in foreign and Russian practice consists of directly assigned ratings, typically carried out by the universities themselves. Among foreign ratings services, the following are notable: the Academic Ranking of World Universities (ARWU rating, or Shanghai Ranking, Shanghai Jiao Tong University); Times Higher Education (THE, a British journal specialising in HE); QS University Rankings by the British educational consulting company Quacquarelli Symonds. The following are prominent among Russian ratings services: National Ranking of Universities (IA Interfax), (National Ranking of Universities, 2012); the “Expert RA” rating agency university ranking (Expert RA, 2013); the ranking of universities compiled by the Ministry of Education and Science of the RF (Russian Ministry of Education) in the monitoring of the effectiveness of educational institutions of HE, (The Ministry of Education and Science of Russia, 2014), (Koksharov, Sandler, Kadochnikov, Tolmachev, 2012). In the international rankings, the positions of education establishments are weighted as follows: ARWU – quality of research (40%) and quality of teaching staff (40%), (Florian, 2007), (ARWU, 2013); THE – quality of teaching (30%), quality of research (30%) and scientific impact of universities

(30%), (THE, 2014); QS – academic reputation (40%), quality of research (20%) and quality of teaching (20%), (Rauhvargers, 2011).

Domestic ratings also introduced weighted scores that apportion the importance of proposed indicators; these are oriented towards a comparison of Russian universities between Russian institutions and those universities identified as world leaders in the provision of educational services. The criterion of the efficiency of the universities estimated ratings consists of the impact of the HE institution in this rating and occupies a position in it. In addition, the Ministry of Education and Science of the RF evaluates the effectiveness of the Russian universities according to the given criteria, oriented towards an identification of inefficient state educational institutions and following their subsequent reorganisation. The drawing up of various kinds of ratings is now both a widespread as well as a polemical analysis tool; for this reason, the different approaches to the rating of HE institutions are periodically criticised by the expert community (Hazelkorn, 2007; Rauhvargers, 2011; Hazelkorn, 2011). The objective of forming global university rankings is seen in terms of providing assistance to consumers of educational services in making a selection from the best universities in the world. The purpose of monitoring conducted by the Ministry of Education of the RF is to evaluate the performance of Russian universities. The authors set themselves a different kind of challenge, offering a methodology to assess the status of the Russian HE system as a whole on the example of some of its regions.

The RF is a country covering over 17 million square kilometres, with a population of 143,700,000 people (Regiony Rossii, 2014) having 8 climatic zones and 11 time zones; as a result, it has quite a varied system of administrative-territorial division. The structure consists of 85 subjects of Russia (regions), 46 of which are referred to as regions (regions), 22 as republics, 9 as kraia (or “edges”), 3 as federal cities, 4 as autonomous districts and 1 as an autonomous region. All RF Subjects are united in 9 groups, called Federal Okrugs (Districts). Of course, the heterogeneity and size of the country affects the features of the development of its regions; often, in order to keep track of events taking place in any field of the processes, it is necessary to carry out the analysis at the regional level (the level of the Federal Subject). Therefore, a necessary step in the implementation of the strategy for reforming the HE system, aimed at fulfilling the basic principles of the Bologna Declaration in Russia, is to carry out a large-scale monitoring of the status of HE at the regional level. The purpose of this monitoring entails a definition of parameter criteria of the system in the RF as a whole, as well as the actual level of its development in the country. This monitoring also permits an evaluation of the accessibility of HE and its quality in the regions of Russia.

The technology for evaluating the system of HE and presentation of results and the results (on the example of Subjects of the RF including in the UFD) are presented by the authors.

2. Method

For the purpose of forming ratings – the comparing of different universities and the choice of a “better” one – the research focused on monitoring the status of HE in every region of Russia in order to take account of the regional particularities of its operation and evaluate the changes taking place in it. As a tool for such monitoring the authors propose a methodology for diagnosing the HE system. This methodology has been designed to assess the conditions of its operation as well as the status of the infrastructure, education and research activities in HE institutions. The resulting data allow for a participatory approach to be taken in the first stage in order to compare the level of development of HE in the territory, and, in the future, to assess its impact on the economy and the population for all subjects of the RF on the basis of the data obtained. As a result, it will be possible to define key directions of the development of HE institutions for each subject of the RF by adjusting existing targets for their activities as well as establishing new ones.

In order to assess the status of HE in Russia, it is proposed to use an indicative analysis method (Kovaleva & Kuklin, 2003), which allows a determination of the degree of compliance achieved at a specific moment of time or the predicted values of the indicator thresholds that meet the relevant requirements of the development of society and to ensure the sustainable development of the regions of the country, taking into account the level of progress and developmental goals.

The diagnosis of the system of HE is carried out using performance indicators, grouped into two units:

- operating conditions and status of the infrastructure of HE;

- status of educational and research activities in HE.

Each of the indicative units consists of three modules (synthetic indicative parameters) that comprise 25 partial indicators, the calculation of which is based on 40 statistical indicators.

The basis of the methodology for the assessment of the HE status system on the method of indicative analysis (Kovaleva & Kuklin, 2003) refer to physical units of various indicators in an indexed (normalised) form of comparison of the values of these indicators and their threshold values according to the rules of the system as a derivation tool.

The setting of thresholds is a separate task. The assignment of objects to a particular status is produced by means of the formation and expert analysis of the educational sample of observations. The task of establishing thresholds for the indicators and classification of observations is related; in order to determine the thresholds, it is necessary to know the initial classification of observations at the level of status; in order to classify observations in terms of status, it is necessary to know the threshold indicators. Therefore, the process of establishing threshold values and classification of cases in the training sample is an iterative process that requires the accumulation of databases and knowledge bases for the assessment of each facility (Kovaleva & Kuklin, 2003). The starting point for the establishment of threshold levels consists in country-specific social and economic benchmarks, the long-term development programme of the territories, leading indicators from developed and developing countries, the level of international standards and quality of life, etc. (Tatarkin & Myzin, 2013).

Thresholds are formed using different methods – regulatory, targeted and expert evaluations. Their values for certain indicators are adjusted according to the conditions of the education system in the particular territory. In terms of classification criteria, based on which all subjects of the RF are grouped by similar values of thresholds group, the following were selected:

- the extent of development of the territory and its level of economic development;
- age structure and population density;
- the standard of living in the territory.

For an analysis of the HE system of Russian regions the following assessment of the level of development for each of the indicators is introduced: high (H), medium (M) and low (L). The medium and low levels are broken into three sublevels respectively. The classification of territory j (subject of the RF) on the considered indicator i to a particular level of status is given by the indicator X_{ji}^t and its thresholds.

All indicators expressed in named (natural) units are converted into an index (normalised) form according to the following relations:

$$\left. \begin{aligned} \text{if } X_{ji}^t \geq X_{C1ji}, \text{ then } X_{ji}^H &= 0 \\ \text{if } X_{ji}^t < X_{C1ji}, \text{ then } X_{ji}^H &= X_{C1ji} - X_{ji}^t / (X_{C1ji} - X_{H1ji}) \end{aligned} \right\} (1)$$

$$\left. \begin{aligned} \text{if } X_{ji}^t \leq X_{C1ji}, \text{ then } X_{ji}^H &= 0 \\ \text{if } X_{ji}^t > X_{C1ji}, \text{ then } X_{ji}^H &= X_{ji}^t - X_{C1ji} / (X_{H1ji} - X_{C1ji}) \end{aligned} \right\} (2)$$

where X_{ji} is the actual value of performance indicators i for the territory j , expressed in named units;

X_{ji}^H is the normalised value indicator i for the territory j , expressed in relative units;

X_{C1ji} , X_{H1ji} are the indicator thresholds i for the territory j and the boundary between the high and middle, middle and low levels, respectively, expressed in named units.

From the ratio of (1), the normalised estimates are determined in cases where, in the native (named) system of units, a decrease in the value of the indicator leads to the deterioration of the education system (“diminishing” type

indicators), and the relation (2), if a deterioration in the status is tending to increase the value indicator (“growing” type). In equations (1) and (2), for the purposes of simplification, the index belonging to the current time period is omitted – t . Classification rules on status performance indicators based on normalised estimates are presented in Table. 1.

Table 1. Classification levels of the education system status by indicative parameters (IP)

Name of level status	Abbreviated notation	Values normalised with respect to IP thresholds	Evaluation status score b_{ji}
High	B	$X_{ji}^H = 0$ and $X_{ji}^H \neq X_{C1}^H$	1
	C1	$0 < X_{ji}^H < X_{C2}^H$ or $X_{ji}^H = X_{C1}^H$	2
Average	C2	$X_{C2}^H \leq X_{ji}^H < X_{C3}^H$	3
	C3	$X_{C3}^H \leq X_{ji}^H < 1$	4
	H1	$1 \leq X_{ji}^H < X_{H2}^H$	5
Low	H2	$X_{H2}^H \leq X_{ji}^H < X_{H3}^H$	6
	H3	$X_{ji}^H \geq X_{H3}^H$	7

After assessment of the status by private indicator, the status of the modules, units and the education system is determined as a whole. To solve this problem, graded scores are introduced. As shown by the experience of various calculations using the proposed methodology, the most appropriate rule for determining the normalised estimates modules, power and status of the object as a whole is the calculation of the weighted average of the normalised evaluation, in which the weights are the status indicators scores (Table 1):

$$C_{kj} = \left(\sum_{i=1}^{N_{kj}} b_{ji} X_{ji}^H \right) / \sum_{i=1}^{N_{kj}} b_{ji} \quad (3)$$

where C_{ji} is the normalised assessment of the status k of the indicative module for the territory j , relative unit;

N_{kj} is the number of indicators in the k indicative module for the territory j , unit;

b_{ji} is the evaluation of the status score of the indicators.

3. Results

The proposed method for diagnosing the HE system status of Russian regions was tested on data from subjects within the UFD for the period 2000-2012. The values of threshold level indicators were regionalised on the basis of the previously described features, according to which three groups of territories were formed. Of the subjects of the UFD, in the first group was classified the Kurgan Region; in the second, the Sverdlovsk, Tyumen (without autonomous districts) and Chelyabinsk Regions; in the third, the KhMAD and YaNAD.

3.1. Operating conditions and status of the HE infrastructure

The status of the education system in this unit was evaluated according to three modules:

- system of HE financing;
- status of foundations and HE learning environments;
- status of human resource capacity of the HE system.

For a more detailed analysis of the situation, we consider the status of its constituent modules. Figure 1 shows the results of the evaluation financing of the HE system module.

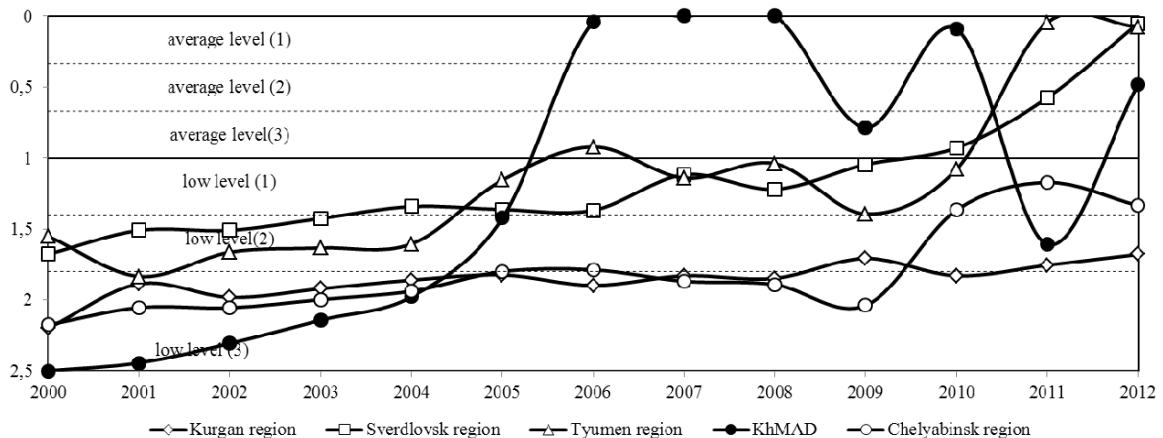


Fig. 1. Dynamics of changes in terms of financing of UFD HE entities for the period 2000-2012

During the analysed period 2000-2012, the status of the system of HE in subjects of the Urals Federal District shows an overall positive trend. Since 2000, there has been an increase in funding from both the public and non-governmental sectors. However, the number of faculty members and university staff in the sphere of research and development has not changed much (compared to 2000 the number of faculty staff had increased by 1.14 times by 2012 and number of researchers by 1.22 times). Based on the analysed data, it can be concluded that funding per faculty and researchers had increased.

In 2000, all UFD subjects received low scores by status of foundations and educational conditions; in 2012, low scores were received by the Sverdlovsk and Kurgan regions; however, Chelyabinsk, Tyumen and KhMAD received high scores in the status of funding of HE institutions. In all regions of the UFD, an increase in the specific value of fixed assets, machinery and equipment per worker in HE institutions was observed. Table 2 shows the changes in the indices in 2012 compared to 2000, 2004 and 2008.

Table 2. Dynamics module indicators of the fund and the learning environment

Subject of the UFD	The cost of fixed assets, machinery and equipment			The number of university staff			Change in the value of the fixed assets, machinery and equipment per worker		
	2000 to 2012	2004 to 2012	2008 to 2012	2000 to 2012	2004 to 2012	2008 to 2012	2000 to 2012	2004 to 2012	2008 to 2012
Ural District	2.85	1.26	0.98	1.38	1.21	1.02	2.29	1.14	1.01
Kurgan region	1.34	0.89	0.88	0.86	1.02	0.94	1.70	0.93	0.96
Sverdlovsk region	1.92	1.05	0.83	1.31	1.10	0.91	1.60	1.03	0.92
Tyumen region	3.25	1.55	1.03	1.72	1.61	1.13	2.13	1.05	0.98
KhMAD	20.93	1.17	0.99	1.67	0.79	0.70	13.55	1.60	1.41

Chelyabinsk region	3.04	1.37	1.10	1.40	1.25	1.17	2.48	1.24	1.03
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Module Indicators of HE human resource capacity indicators permit an evaluation of the security of the system of HE faculty members, researchers, and a determination of their level of qualification under the criterion of the presence of academic degrees. This module includes two synthetic indicators:

- at the level of security of the faculty system of HE, which is calculated on the basis of two partial indicators: the proportion of faculty members and researchers in the aggregate of employees of universities; the number of students per teacher in HE institutions;
- the level of the professional formation of the system of HE, which is calculated on the basis of two partial indicators: in the practical quantity of employees with academic degrees at the level of doctor and candidate of sciences.

The results indicate a positive dynamics of the status of human resource capacity of HE in the UFD. For example, in 2000 all subjects UFD got low marks in the whole of this unit; however, by 2012 the status of human resource capacity of the system of HE in the analysed regions had improved, and the tendency towards the transition of assessments of the Chelyabinsk and Sverdlovsk regions in the mid-level area, was bringing them closer to the evaluation of the human resources potential of the KhMAD (NO = 1,496). In the Kurgan region and in the south of the Tyumen region only a slight improvement in human resource capacity of the system of HE can be noted.

The analysis of the module for the human resource capacity of the HE system shows that on average in the UFD, the proportion of faculty and research workers in the total number of employees of universities consisted 45% in 2000 (KhMAD - 49%); in 2012, there was a gradual decline in the proportion of academics and researchers, the average for the UFD – up to 38%. In the Tyumen region and KhMAD the proportion of academics and researchers compared to the total number of employees of universities in 2012 was 35%; in the Chelyabinsk and Sverdlovsk regions the proportion was 39%, while in the Kurgan region it was 41%.

The dynamic of the number of students per teacher for the period 2000-2012 in the subjects of the Urals Federal District has a different trend. Only a small positive trend was observed in the Sverdlovsk region (a reduction in the ratio of students to teacher from 19 people in 2000 to 17 in 2012). The remaining regions are characterised by negative dynamics: in Kurgan and Tyumen regions and KhMAD the number of students per teacher had reached 24 people by 2012.

The indicator of the number of employees with academic degrees for the analysed period shows a positive trend: by 2012, it had doubled compared with 2000, with the largest increase being observed in 2009 in all regions. On average in the UFD in 2000 for 100 university staff, 25 people had advanced degrees. By 2009, an average of UFD specific number of workers with advanced degrees to 100 university staff had reached 50 people. After 2009, a significant change is observed in this indicator.

Based on these results, we can conclude that for the past 13 years the operating conditions and status of the HE infrastructure of the UFD have improved somewhat, although their score remained within the lower level. The most noticeable improvement was noted in the Chelyabinsk region in the south of the Tyumen region and KhMAD: an integrated assessment of the status of HE in this unit is close to the boundary of the average level.

3.2. Status of educational and scientific research activity in the HE system

The status of the education system in this unit is evaluated according to three modules:

- status of the research capacity of the teaching staff;
- status of the educational and research capacity of students;
- the impact of research activities of the HE system.

Based on the analysis of the results of this unit, conclusions can be drawn concerning the effectiveness of the HE system. For a more detailed analysis, let us analyse its components.

The module of the research potential of the faculty of the system of the composition of the HE is characterised by two synthetic indicators:

- research status of scientific, technical staff and faculty of the HE system, which is estimated by the criterion of the presence or absence of academic degrees;

- the level of involvement of scientific, technical staff and faculty in research and development, which is estimated in terms of specific R&D expenditures per employee in research work and the indicator number of the protection of employees of the university.

In general, the assessment of the research capacity of the teaching staff in HE in the UFD lies at a low level. Compared to 2000 estimates, the faculty research capacity remained at the same level in the Sverdlovsk and Tyumen regions in 2012 (deteriorated only slightly).

The indicator of researchers with a doctorate degree or candidate of science changed slightly during the analysed period. In the Kurgan and Tyumen regions, a decrease was observed in the number of scientists with a PhD, and, in KhMAD – candidates. Indicator specific R&D expenditure has trends that vary by subject of the UFD; for each region, maximum and minimum values are recorded in different years. For example, in KhMAD the maximum value of the indicator was achieved in 2007 (400 thousand rubles per person in 2009 prices), compared to the minimum in 2000 (7.2 thousand rubles per person). In the Sverdlovsk region significant R&D funding gap values were observed (maximum value in 2012 144 thousand rubles per person; the minimum in 2000 was 47 thousand rubles per person in 2009 prices). As for the other subjects, the indicator changes show a positive trend with a more or less steady pace.

The module of the educational and research capacity of students allows an evaluation of the level of involvement of students in research activities and their academic performance. The module is calculated on the basis of the two synthetic indicators:

- the level of training students, which includes two private indicators: the number of students receiving scholarships, the winners of competitions (tenders) and the number of full-time students;
- the level of involvement of students in research activities, which includes two private indicators: number of scientific publications and presentations at scientific conferences with the participation of students and number of documents of title to intellectual property of students.

The educational and research capacity of students in HE has improved in all regions of the Urals Federal District with the exception of the KhMAD.

Compared to 2000, positive dynamics were shown in 2012 for all analysed parameters: the involvement of students in research activities increased.

The module of efficiency of research activities of HE allows the evaluation of publications and innovative activity systems of workers in the HE system. This unit includes two synthetic indicators:

- level of innovation activity of scientific, technical staff and faculty, which is estimated by the number of supported patents and registered computer programs per researcher and faculty;
- level of publication activity of the faculty, which was estimated to 2011 inclusive in three partial indicators (number of academic publications, scientific articles, monographs), and from 2012 to four private indicators (number of academic publications, monographs and articles indexed in the Web of Science, Scopus and RISC databases).

In general, the dynamics shaping module is characterised by positive indicators: in 2000, the assessment of all subjects was in the worst part of a low level, whereas by 2012 it was possible to say that there is a tendency towards progress in the average rating.

The results show that from 2000 to 2012 the state of the educational and research activities in the regions of the UFD improved somewhat, although those estimates were in the range of low values (less than the entire situation had changed in the Kurgan region).

Figure 2 shows a mapping of the HE system status as a whole in 2000 and 2012.

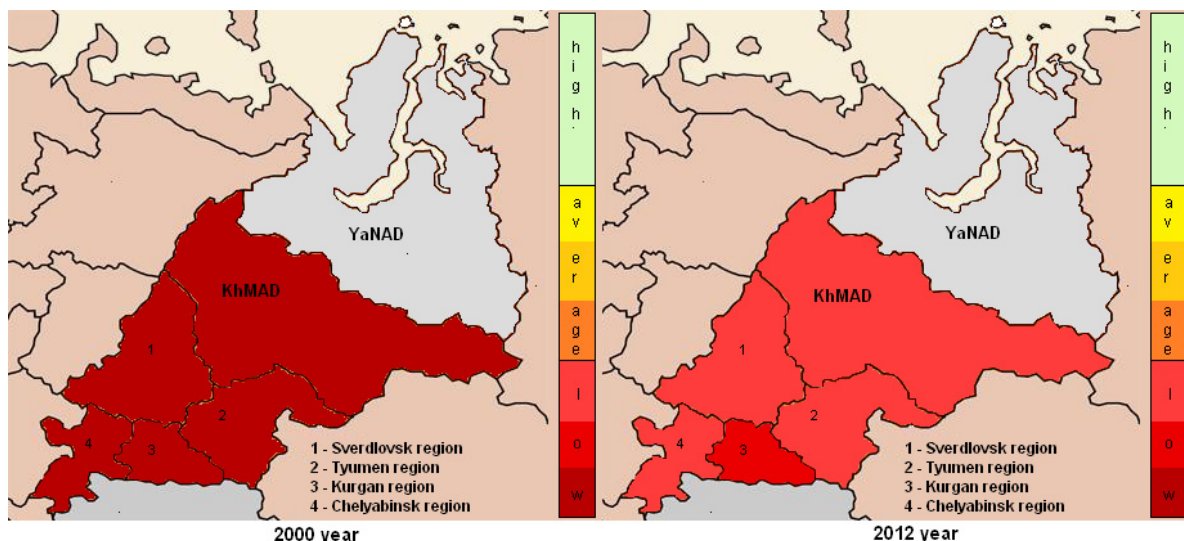


Fig. 2. Cartographic mapping of the state system of HE subjects of the UFD

During the analysed period as a whole, a positive dynamics of development of HE in all regions of the UFD is indicated; this is illustrated by the approach of an integrated assessment of the state system of HE in the UFD from low to medium level of development, with the exception of the Kurgan region, where dynamics of improving estimates were less pronounced (normalised assessment of the HE system of Kurgan region decreased from 1,878 in 2000 to 1,659 in 2012). Based on this analysis, we can conclude that, despite the positive dynamics in the development of the HE system of the UFD for the period 2000-2012, increasing its effectiveness requires considerable effort, as evidenced by a low value of integrated assessments of the state of IN in the subjects of the UFD.

4. Conclusion

We can deduce that since the turn of the century there has been some improvement in the system of HE as a whole within the UFD as well as a marked improvement in the Sverdlovsk, Tyumen (southern region) and Chelyabinsk regions and in the KhMAD.

In this connection, the overall increase in the level of development of the HE system in the Sverdlovsk region was achieved by means of an improvement in the state of educational and research activity against the background of slightly changed conditions of its functioning and the state of the infrastructure. Conversely, in the KhMAD, despite the marked improvement in operating conditions and the state of the HE infrastructure system, a significant improvement in educational and research activity did not take place. The analysis conducted over a time period of 12 years has shown that, unfortunately, a direct correlation between the growth of investments and an increase in quality is not observed. The growth rate of financing of regional HE was in some cases several times higher in one region than another, increasing the visibility of the results. It is clear that the leaders in terms of financing and the leaders in terms of improving the quality of education are two different things. This demonstrates the need to reform the regulation of HE, particularly with regard to prioritising its development and improving the financial and economic mechanisms required to achieve this.

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